

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Patent Application of: Paul D. Ringgenberg
Serial No.: 10/790,908
Filed: March 2, 2004
Entitled: DISTRIBUTED TEMPERATURE
SENSING IN DEEP WATER SUBSEA
TREE COMPLETIONS
Group Art Unit: 2883
Examiner: C. Peng

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Appellant hereby timely submits this Appeal Brief under the provisions of 37 CFR §41.37 and respectfully requests consideration thereof before the Board of Patent Appeals and Interferences. Appellant's Notice of Appeal was filed on October 27, 2006, appealing to the Board from the decision of the examiner, mailed August 24, 2006, finally rejecting the claims of the above-identified patent application.

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REAL PARTY IN INTEREST

The real party in interest is the assignee of the present application, Halliburton Energy Services, Inc.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to appellant, the appellant's legal representatives or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

STATUS OF CLAIMS

Claims 1-57 were originally filed in the present application. Claims 1-28 and 51-57 were canceled pursuant to a requirement for restriction.

Claims 29-50 are currently pending and being considered in the application.

Claims 29-50 are rejected.

Claims 29-50 are being appealed.

STATUS OF AMENDMENTS

No amendments have been filed after the date of the August 24, 2006 Office Action.

SUMMARY OF CLAIMED SUBJECT MATTER

In one important aspect of the invention recited in independent claim 29 (an embodiment of which is depicted in FIG. 1 of the drawings), one assembly 36 is used to convey another assembly 34 into a well. Each assembly 34, 36 has a respective optical fiber section 68, 62 attached to it. Each assembly 34, 36 also has a respective optical connector 66, 64 attached to it in order to transmit light between the optical fiber sections 68, 62.

The embodiment depicted in FIG. 1 is described at page 5, line 3 to page 13, line 10 of the specification.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Claims 29-40 are rejected under 35 USC §102(e) as being anticipated by U.S. Patent No. 6,933,491 to Maida, Jr.;

Claims 41-43 are rejected under 35 USC §103(a) as being unpatentable over Maida in view of U.S. Patent No. 5,435,351 to Head;

Claims 44-47 are rejected under 35 USC §103(a) as being unpatentable over Maida in view of prior art disclosed by Maida; and

Claims 48-50 are rejected under 35 USC §103(a) as being unpatentable over Maida in view of U.S. published application no. 2005/0092501 to Chavers, et al.

ARGUMENT

The present invention advances the art of installing assemblies with associated optical fiber sections in subterranean wells. In the past, such assemblies were installed with no means of detecting whether their respective optical fiber sections or associated connectors were damaged. This meant that the damage was not discovered until the entire installation was completed, by which time extraordinary expense and delay were required to repair the damage.

In contrast, the present invention provides a system wherein both an assembly used to install another assembly in a well, as well as the assembly which is being installed, have a respective optical connector and optical fiber section attached thereto. The optical connectors are connected during the installation process, so that by transmitting light through both of the optical fiber sections, the optical quality of the optical fiber section and connector on the installed assembly can be monitored. Thus, this system permits any damage to the installed optical fiber section to be detected immediately, so that repairs can be performed most efficiently and economically.

In the claims, these two assemblies are identified as “first” and “second” assemblies. The first assembly is the one which is conveyed into the well. The second assembly is the one which is used to convey the first assembly into the well. Each of these assemblies has a respective optical fiber section and optical connector, with the optical connectors being connected in order to transmit light through the connectors between the optical fiber sections.

Rejections under 35 USC §102(e) over Maida

Claim 29

Independent claim 29 requires that a second assembly is used to convey a first assembly at least partially into a well. An optical connector attached to the second assembly is connected to an optical connector attached to the first assembly in order to transmit light between an optical fiber section attached to the second assembly and an optical fiber section attached to the first assembly.

In contrast, Maida describes a fiber optic cable 110 with sensors 34 installed in a wellbore 108 (see FIG. 2). Maida does describe that the cable 110 could be attached to a production tube or casing (see col. 4, lines 59-64), but the installation process is not described. There are no optical connectors at all described by Maida for use with conveying and conveyed assemblies.

Clearly, Maida does not describe one assembly being used to convey another assembly into a well, with connectors on the assemblies being connected and transmitting light between optical fiber sections on the assemblies during the installation process. In the Office Action, the examiner identifies the recited first assembly as corresponding to the sensors 34, and the recited second assembly as corresponding to the wellhead 106. However, there is no optical connector attached to the sensors 34, there is no optical connector attached to the wellhead 106, there is no connection between the nonexistent connectors which transmits light between respective optical fiber sections attached to the sensors and wellhead, etc.

The test for anticipation is whether, in a single usable prior art reference, all of the elements and limitations recited in a claim are disclosed. This is not the case here. Instead, several important elements and limitations recited in claim 29 are clearly missing from the cited reference. Accordingly, claim 29 is not anticipated by the reference, and the Board is respectfully requested to direct the examiner to withdraw the rejections of claim 29 and its dependents.

Claim 30

This claim is dependent from claim 29 and, for at least the reasons discussed above, is not anticipated by the Maida reference.

In addition, claim 30 recites that the first and second assemblies are releasably secured to each other, so that the first assembly is detachable from the second assembly for retrieval of the second assembly from the well. These limitations are not described by Maida.

If the sensors 34 of Maida correspond to the recited first assembly, and the wellhead 106 of Maida corresponds to the recited second assembly, as proposed by the examiner in the Office Action, then where is it described in Maida that the sensors are detachable from the wellhead for retrieval of the wellhead from the well? The answer is that such detaching and retrieving of the wellhead 106 is simply not described by Maida.

In fact, the wellhead 106 is not even conveyed into the well in the first place. Instead, the wellhead 106 is installed on the ocean floor 30.

Maida clearly does not describe the sensors 34 being detachable from the wellhead 106, or retrieval of the wellhead from the well, and so for these additional reasons the claim is not anticipated by Maida. The Board is respectfully requested to direct the examiner to withdraw the rejections of claim 30 and its dependents.

Claim 31

This claim is dependent from claim 30 and, for at least the reasons discussed above, is not anticipated by the Maida reference.

In addition, claim 31 recites that the optical connectors are disconnectable along with the first and second assemblies being released for displacement relative to each other. Thus, when the first and second assemblies release for relative displacement, the optical connectors can also be disconnected. These limitations are not described at all in the Maida reference.

Maida does not describe any release for relative displacement between the sensors 34 and the wellhead 106. Maida also does not describe any optical connectors being disconnectable when there is relative displacement between the sensors 34 and the wellhead 106. Therefore, for these additional reasons, claim 31 is not anticipated by Maida, and the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 31.

Claim 32

This claim is dependent from claim 30 and, for at least the reasons discussed above, is not anticipated by the Maida reference.

In addition, claim 32 recites that the optical connectors are disconnectable along with retrieval of the second assembly. As discussed above, Maida does not describe the optical connectors recited in the claims. Maida also does not describe retrieval of the wellhead 106 (which the examiner contends corresponds to the recited second assembly).

Furthermore, Maida does not describe disconnection of any optical connectors along with retrieval of the wellhead 106. For these additional reasons Maida does not anticipate claim 32, and the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 32.

Claims 33 and 35

Claim 33 is dependent from claim 29 and, for at least the reasons discussed above, is not anticipated by the Maida reference.

In addition, claim 33 recites that a light transmission quality monitor is connected to the second optical fiber section. Claim 35 is dependent from claim 33 and recites that the monitor measures a light transmission quality of the second optical fiber section.

Maida does not describe any light transmission quality monitor connected to the recited second optical fiber section. For this additional reason Maida does not anticipate claim 33 or claim 35, and the Board is respectfully requested to direct the examiner to withdraw the rejections of claim 33 and its dependents.

Claim 34

This claim is dependent from claim 33 and, for at least the reasons discussed above, is not anticipated by the Maida reference.

In addition, claim 34 recites that the monitor measures a light transmission quality of the first optical fiber section. Note that claim 33 recites that the monitor is connected to the second optical fiber section, but claim 34 recites that the monitor measures a light transmission quality of the first optical fiber section.

These limitations are clearly not described by Maida. For this additional reason Maida does not anticipate claim 34, and the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 34.

Claim 36

This claim is dependent from claim 33 and, for at least the reasons discussed above, is not anticipated by the Maida reference.

In addition, claim 36 recites that the monitor measures a light transmission quality of the connected optical connectors. As discussed above, Maida does not describe the recited optical connectors.

Furthermore, Maida clearly does not describe any light transmission quality monitor which measures a light transmission quality of the connected optical connectors. For this additional reason Maida does not anticipate claim 36, and the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 36.

Claim 37

This claim is dependent from claim 33 and, for at least the reasons discussed above, is not anticipated by the Maida reference.

In addition, claim 37 recites that the light transmission quality indicates whether the optical connectors are operatively connected. As discussed above, Maida does not describe the recited optical connectors.

Furthermore, Maida clearly does not describe any light transmission quality which indicates whether the optical connectors are operatively connected. For this

additional reason Maida does not anticipate claim 37, and the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 37.

Claim 38

This claim is dependent from claim 29 and, for at least the reasons discussed above, is not anticipated by the Maida reference.

In addition, claim 38 recites that further optical connectors are connected in the well when the first assembly is conveyed into the well by the second assembly. As discussed above, Maida does not describe any of the recited optical connectors, and Maida does not describe the sensors 34 being conveyed into the well by the wellhead 106.

Maida also does not describe any additional optical connectors being connected when the sensors 34 are conveyed into the well, or any optical connectors being connected in the well. For these additional reasons Maida does not anticipate claim 38, and the Board is respectfully requested to direct the examiner to withdraw the rejections of claim 38 and its dependents.

Claim 39

This claim is dependent from claim 38 and, for at least the reasons discussed above, is not anticipated by Maida.

In addition, claim 39 recites that a light transmission quality monitor connected to the second optical fiber section measures a light transmission quality of the further optical connectors connected in the well. As discussed above, Maida does not describe the further optical connectors connected in the well.

Maida also does not describe any monitor connected to the second optical fiber section which measures any quality of the further optical connectors. For these additional reasons Maida does not anticipate claim 39, and the Board is respectfully

requested to direct the examiner to withdraw the rejections of claim 39 and its dependent.

Claim 40

This claim is dependent from claim 39 and, for at least the reasons discussed above, is not anticipated by Maida.

In addition, claim 40 recites that the light transmission quality measured by the monitor indicates whether the further optical connectors are operatively connected. As discussed above, Maida does not describe the further optical connectors recited in claim 38 or the light transmission quality monitor recited in claim 39.

Furthermore, Maida does not describe that the light transmission quality of the further optical connectors measured by the monitor indicates whether the connectors are connected. For these additional reasons Maida does not anticipate claim 40, and the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 40.

Rejections under 35 USC §103(a) over Maida in view of Head

Claim 41

Claim 41 is dependent from claim 29 and, for at least the reasons discussed above, Maida does not disclose the elements and limitations recited in the claims. These deficiencies of the Maida reference are not cured at all by the addition of the teachings of the Head reference.

Claim 41 recites that the optical connectors are positioned above an anchor on the first assembly, with the anchor securing the first assembly in the well. In the Office Action, the examiner proposes that the recited first assembly corresponds to the sensors 34 of Maida, and the recited anchor corresponds to the apparatus 20 described by Head.

As discussed above, the recited optical connectors are not described at all by Maida. In addition, there is no description or suggestion found in either of the Maida

and Head references of the optical connectors being positioned above any anchor. Furthermore, neither of the references describes or suggests how the sensors 34 could be anchored using the apparatus 20. Head merely describes the apparatus 20 being used to anchor a conduit 21.

Clearly, a person skilled in the art would not find it obvious to modify the teachings of Maida to incorporate the teachings of Head to produce the invention recited in claim 41. Firstly, the references do not describe all of the elements and limitations recited in the claim. Secondly, there is no methodology provided in either reference for attaching the anchoring apparatus 20 of Head to the sensors 34 of Maida.

Therefore, a *prima facie* case of obviousness has not been made out for claim 41. For this additional reason the Board is respectfully requested to direct the examiner to withdraw the rejections of claim 41 and its dependents.

Claim 42

This claim is dependent from claim 41 and, for at least the reasons discussed above, a *prima facie* case of obviousness of claim 42 has not been made out.

In addition, claim 42 recites that the anchor is a tubing hanger. Head does describe that the anchoring apparatus 20 is used to anchor a conduit. However, the claim requires that the anchor secures the first assembly in the well, and the examiner contends that the recited first assembly corresponds to the sensors 34 of Maida. If the sensors 34 are the first assembly, and the anchoring apparatus 20 is used to secure the sensors in the well, then there is simply no way that the anchor is a tubing hanger.

It cannot be both ways. Either the anchoring apparatus 20 is used to secure a conduit, as described by Head, or the apparatus is used to secure the sensors 34, as proposed by the examiner. Neither Head nor Maida describes how the apparatus 20 could be used to secure the sensors 34. Head does describe the apparatus 20 as being used to secure a conduit, but the conduit is not the first assembly recited in the claims. Instead, the examiner identifies the sensors 34 of Maida as being the first assembly.

Thus, for these additional reasons, a *prima facie* case of obviousness has not been made out for claim 42. Accordingly, the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 42.

Claim 43

This claim is dependent from claim 41 and, for at least the reasons discussed above, a *prima facie* case of obviousness of claim 43 has not been made out.

In addition, claim 43 recites that the optical connectors are positioned between the anchor and a light transmission quality monitor connected to the first optical fiber section. As discussed above, Maida does not describe the optical connectors recited in the claims.

Maida also does not describe a light transmission quality monitor connected to the first optical fiber section. And clearly, neither of the references in any way suggests that the optical connectors are positioned between the monitor and an anchor which secures the first assembly in the well.

These limitations are simply not found anywhere in the cited references. Therefore, a *prima facie* case of obviousness has not been made out for claim 43, and for this additional reason the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 43.

Rejections under 35 USC §103(a) over Maida in view of prior art disclosed by Maida

Claim 44

Claim 44 is dependent from claim 29 and, for at least the reasons discussed above, Maida does not disclose the elements and limitations recited in the claims. These deficiencies of the Maida reference are not cured at all by the addition of the purported prior art disclosed by Maida.

Claim 44 recites that the first assembly is a production tubing string and the second assembly is a work string. The examiner cites the Maida prior art disclosure of

FIG. 1 for its alleged teaching of optical fiber sensors and transducers in the sensor assembly 34 carried on production tubing string 24.

However, Claim 44 requires that a work string (the second assembly) is used to convey a production tubing string (the first assembly) into the well, that respective optical fiber sections are attached to the work string and production tubing string, that respective optical connectors are attached to the work string and production tubing string, and that the optical connectors transmit light between the optical fiber sections. Maida simply does not disclose the work string used to convey the production tubing string, the respective optical fiber sections, the optical connectors or the transmission of light through the optical connectors between the optical fiber sections.

Therefore, for these additional reasons a *prima facie* case of obviousness has not been made out for claim 44. The Board is respectfully requested to direct the examiner to withdraw the rejections of claim 44 and its dependents.

Claim 45

This claim is dependent from claim 44 and, for at least the reasons discussed above, a *prima facie* case of obviousness of claim 45 has not been made out.

In addition, claim 45 recites that the production tubing string engages a completion string in the well, thereby connecting further optical connectors in the well. Note that this claim thus requires that a work string is used to convey a production tubing string in the well (as recited in claim 44), that the production tubing string engages yet another string (a completion string) in the well, and that this engagement connects further optical connectors in the well.

None of this (other than a production tubing string) is described in the Maida reference. Furthermore, as discussed above, the optical connectors and optical fiber sections attached to the respective work and production tubing strings are simply not described by Maida.

Clearly, the elements and limitations recited in claim 45 simply are not described or even suggested in the Maida reference, and for these additional reasons a *prima facie*

case of obviousness has not been made out for claim 45. Accordingly, the Board is respectfully requested to direct the examiner to withdraw the rejections of claim 45 and its dependents.

Claim 46

This claim is dependent from claim 45 and, for at least the reasons discussed above, a *prima facie* case of obviousness of claim 46 has not been made out.

In addition, this claim requires that a light transmission quality monitor is connected to the first optical fiber section. Maida clearly does not describe or suggest such a monitor connected to the first optical fiber section. For this additional reason, a *prima facie* case of obviousness of claim 46 has not been made out, and the Board is respectfully requested to direct the examiner to withdraw the rejections of claim 46 and its dependent.

Claim 47

This claim is dependent from claim 46 and, for at least the reasons discussed above, a *prima facie* case of obviousness of claim 47 has not been made out.

In addition, this claim requires that the monitor measures a quality of light transmission through the optical connectors attached to the work and production tubing strings, through the first and second optical fiber sections, and through the further optical connectors in the well. Note that the claim requires a specific light transmission through a specific combination of elements, and a measurement of a quality of this light transmission by the monitor.

Clearly, Maida does not describe any of these elements or limitations recited in claim 47. For this additional reason, a *prima facie* case of obviousness of claim 47 has not been made out, and the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 47.

Rejections under 35 USC §103(a) over Maida in view of Chavers

Claim 48

Claim 48 is dependent from claim 45 and, for at least the reasons discussed above, Maida does not disclose the elements and limitations recited in the claims. These deficiencies of the Maida reference are not cured at all by the addition of the teachings of the Chavers reference. Thus, a *prima facie* case of obviousness of claim 48 has not been made out.

In addition, claim 48 recites that the completion string is gravel packed in the well. As discussed above, Maida does not describe the completion string. The Chavers reference is used by the examiner for its teaching of gravel packing a completion string.

However, there simply is no teaching of optical connectors attached to respective work and production tubing strings, optical fiber sections attached to the respective work and production tubing strings, connecting further optical connectors in the well upon engagement between the production tubing and completion strings, etc.

For these additional reasons, a *prima facie* case of obviousness of claim 48 has not been made out. Therefore, the Board is respectfully requested to direct the examiner to withdraw the rejections of claim 48 and its dependents.

Claim 49

This claim is dependent from claim 48 and, for at least the reasons discussed above, a *prima facie* case of obviousness of claim 49 has not been made out.

In addition, claim 49 recites that an optical transmission quality of a third optical fiber section attached to the completion string is monitored while the completion string is gravel packed in the well. There simply is no disclosure at all of these elements and limitations in the Maida and Chavers references.

For these additional reasons, a *prima facie* case of obviousness of claim 49 has not been made out. Therefore, the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 49.

Claim 50

This claim is dependent from claim 48 and, for at least the reasons discussed above, a *prima facie* case of obviousness of claim 50 has not been made out.

In addition, claim 50 recites that an optical transmission quality of a third optical fiber section attached to the completion string is monitored after the completion string is gravel packed in the well. There simply is no disclosure at all of these elements and limitations in the Maida and Chavers references.

For these additional reasons, a *prima facie* case of obviousness of claim 50 has not been made out. Therefore, the Board is respectfully requested to direct the examiner to withdraw the rejection of claim 50.

Respectfully submitted,
SMITH IP SERVICES, P.C.

A handwritten signature in black ink, appearing to read "Marlin R. Smith". The signature is fluid and cursive, with the first name "Marlin" being the most prominent part.

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Dated: October 27, 2006

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CLAIMS APPENDIX

1-28. (canceled)

29. An optical fiber well installation system, comprising:
a first assembly;

a second assembly used to convey the first assembly at least partially into the well; and

an optical connector attached to each of the first and second assemblies, the optical connectors being connected in order to transmit light through the connected optical connectors between a first optical fiber section attached to the first assembly and a second optical fiber section attached to the second assembly.

30. The system of claim 29, wherein the first and second assemblies are releasably secured to each other, so that the first assembly is detachable from the second assembly for retrieval of the second assembly from the well.

31. The system of claim 30, wherein the optical connectors are disconnectable along with the first and second assemblies being released for displacement relative to each other.

32. The system of claim 30, wherein the optical connectors are disconnectable along with retrieval of the second assembly.

33. The system of claim 29, further comprising a light transmission quality monitor connected to the second section.

34. The system of claim 33, wherein the monitor measures a light transmission quality of the first section.

35. The system of claim 33, wherein the monitor measures a light transmission quality of the second section.

36. The system of claim 33, wherein the monitor measures a light transmission quality of the connected optical connectors.

37. The system of claim 33, wherein the light transmission quality indicates whether the optical connectors are operatively connected.

38. The system of claim 29, wherein further optical connectors are connected in the well when the first assembly is conveyed into the well by the second assembly.

39. The system of claim 38, further comprising a light transmission quality monitor connected to the second section, the monitor measuring a light transmission quality of the further optical connectors connected in the well.

40. The system of claim 39, wherein the light transmission quality indicates whether the further optical connectors are operatively connected.

41. The system of claim 29, wherein the optical connectors are positioned above an anchor on the first assembly, the anchor securing the first assembly in the well.

42. The system of claim 41, wherein the anchor is a tubing hanger.

43. The system of claim 41, wherein the optical connectors are positioned between the anchor and a light transmission quality monitor connected to the first section.

44. The system of claim 29, wherein the first assembly is a production tubing string and the second assembly is a work string.

45. The system of claim 44, wherein the production tubing string engages a completion string in the well, thereby connecting further optical connectors in the well.

46. The system of claim 45, wherein a light transmission quality monitor is connected to the first section.

47. The system of claim 46, wherein the monitor measures a quality of light transmission through the optical connectors attached to the work and production tubing strings, through the first and second sections, and through the further optical connectors connected in the well.

48. The system of claim 45, wherein the completion string is gravel packed in the well.

49. The system of claim 48, wherein an optical transmission quality of a third optical fiber section attached to the completion string is monitored while the completion string is gravel packed in the well.

50. The system of claim 48, wherein an optical transmission quality of a third optical fiber section attached to the completion string is monitored after the completion string is gravel packed in the well.

51-57. (canceled)

EVIDENCE APPENDIX

(none)

RELATED PROCEEDINGS APPENDIX

(none)